FIG. 5 is a plan view taken on line 5—5 of FIG. 1, showing the trough for cloud water sample collections;

FIG. 6 is a section taken on line 6—6 of FIG. 5;

FIG. 7 is a detail illustrating the means connected to the trough of FIG. 6 for discharging cloud water collected in the trough of FIG. 6, into a sample bottle;

FIG. 8 is an adapter inlet which can be connected to the front of the cloud water collector of FIG. 1, which prevents the larger rain droplets from entering the device;

FIG. 9 is a top view of the adapter inlet of FIG. 8;

FIG. 10 is a front elevation of the automated sampler employed in conjunction with the cloud water collector of FIGS. 1-9;

FIG. 11 is a detailed front elevational view of the carousel assembly for supporting the sample bottles, of FIG. 10;

FIG. 12 is another detail of the sampler device of FIG. 1, showing the collector reservoir and overflow device employed in conjunction therewith;

FIG. 13 is a plan view of the carousel or turntable of FIG. 11;

FIG. 14 is a block diagram of the associated elements for operating the automated sampler of FIG. 10; and

FIG. 15 illustrates use of the automated sampler of FIG. 10 for collecting rain water samples.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1, 2 and 3 of the drawings, numeral 20 indicates a cloud water collector according to the invention, comprising an outer housing 21 having a front section 22 and a rear section 24, the front being open at 26 and the back of the collector being open at 28. The housing of collector 20 is in the form of a box having an essentially square cross-section, the rear section 24 of the collector being flared outwardly as indicated at 29 to accommodate a fan or blower 30 in a rear portion 32. The front and rear sections are provided with flanges 25 which are connected by bolts 27.

The outer housing 21 of the cloud water collector is preferably comprised of a clear poly (methyl methacrylate) resin (Plexiglas). Other clear inert plastics can be employed, such as polypropylene or polyethylene. However, the latter two materials tend to degrade in sunlight over a period of time.

Viewing also FIG. 1*a*, a series of three screens 34, each formed of two parallel rows of Teflon strands or filaments, and described in greater detail below, are mounted and inclined at an acute angle in the front section 22 of the collector, adjacent the open front end 26 thereof. A honeycomb element 36 is mounted across substantially the central portion of the collector between the front and rear sections 22 and 24 thereof.

The fan 30 is mounted on a bracket 38 which is suitably bolted at 40 to a support member 42 mounted on the back 28 of the collector.

Now referring to FIGS. 1*a*, 4 and 4*a*, the screens 34 are each formed of a rectangular frame 43 comprised of two stainless steel upper and lower rods 44, preferably Teflon coated, suitably fastened at their ends to opposite side bars 46. Stiffener webs 45 are positioned across frame 43 adjacent the rods 44 at the top and bottom of the frame and are suitably welded at 49 to the opposite side bars 46. The rods 44 are threaded at 47 to received a Teflon strand 48 which is wound around the rods 44 in a vertical direction along the entire width of the screen extending from one side bar 46 to the opposite side bar. It has been found that in order to obtain efficient collection of fog droplets of a size ranging from 1 to 100 microns in diameter, and particularly of droplets in the range of about 5 to about 30 microns, the main portion of fog droplets which impact and collect on the Teflon strands, a preferred diameter of the Teflon strands ranges from about 0.015" to about 0.025", an optimum strand diameter being 0.020".

The spacing between adjacent strands of the filament 48, and hence the spacing between the threads 47 receiving the strands, is preferably between 0.06" and 0.08", optimally about 0.070".

It is preferred to minimize the size or diameter of the Teflon filament while still maintaining it sufficiently large so that it is strong and durable and does not break over a long period of use. The space between adjacent strands mounted on the rods 44 of the frame 43 should be sufficiently large to permit free flow of the cloud water sample through the screen while permitting efficient impaction of fog droplets from the flow of the cloud sample, on the Teflon filaments. Referring to FIG. 1*a*, it will be noted that each of the screens 34 is comprised of two parallel rows 50 of the Teflon strands 48 mqunted on the opposite rods 44.

Referring now to FIGS. 1 and 1*a*, the Teflon screens 34 are mounted at an acute angle, most particularly at an angle of 35° to the direction of the incoming flow of the cloud sample introduced through inlet 26. For this purpose, grooves 52 are provided in the opposite side walls 54 of the front section 22 of the collector, such grooves being inclined at a 35° angle to accommodate the side bars 46 of each of the Teflon screens 34 mounted in parallel inclined relation at such angle in the front section of the collector. It will be seen that in the present embodiment, three collector screens 34 are employed, mounted parallel to each other, and in closely spaced relation within the front section of the collector. The frames 43 of the screens are suitably fastened at 56 and 58 in brackets 60 and 62 mounted respectively in the top 64 and bottom 66 of the front section of the collector.

In the embodiment illustrated in FIGS. 1 and 1*a* employing three Teflon screens 34, since there are two rows of Teflon strands 50 for each screen, there is a total of six rows of Teflon strands in the three screen arrangements shown. In such an arrangement, with Teflon strands of the optimum diameter of 0.020" and a spacing of 0.070", the first row of strands on the first screen 34 facing the inlet 26 samples about 28% of the incoming cloud sample flow, and when all six rows of strands formed by the three screens are included, such six rows sample about 86% of the total air. While it is preferred not to employ more than three Teflon screens 34, only one or two of such screens can be employed if it is desired to slow the collection rate down.

Although the optimum angle of inclination of the screens is 35°, as noted above, the angle of the Teflon screens can range from about 30° to about 40°. Inclining the screens at such angles, particularly the optimum angle of 35°, prevents resuspension into the air flow of fog droplets impacted onto the Teflon filaments. Further, once the droplets are collected on the strands, it is desirable that they be removed from the environment of the sample flow as quickly as possible to prevent evaporation. The above-noted angle of inclination aids in obtaining rapid flow of the droplets down the filaments for collection as quickly as possible. A baffle 67 is provided and suitably connected to the top of the housing